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AN EXPLORATORY STUDY OF THE UTILIZATION OF EVIDENCE-BASED
PHARMACOLOGICAL TREATMENT ON HEART FAILURE PATIENTS IN
MISSISSIPPI AND ITS IMPACT ON READMISSION

by

Keri Annalyn Barron

A Dissertation
Submitted to the Graduate School
and the Department of Systems Leadership and Health Outcomes
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

Approved:

Dr. Sheila Davis, Committee Chair
Professor, Systems Leadership and Health Outcomes

Dr. Bonnie Harbaugh, Committee Member
Professor, Systems Leadership and Health Outcomes

Dr. Patsy Anderson, Committee Member
Associate Professor, Systems Leadership and Health Outcomes

Dr. Hwanseok Choi, Committee Member
Assistant Professor, Public Health

Dr. Karen Winters, Committee Member
Professor, Nursing, University of Mississippi Medical Center

Dr. Karen S. Coats
Dean of the Graduate School

May 2017

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Published by the Graduate School



ABSTRACT

AN EXPLORATORY STUDY OF THE UTILIZATION OF EVIDENCE-BASED PHARMACOLOGICAL TREATMENT ON HEART FAILURE PATIENTS IN MISSISSIPPI AND ITS IMPACT ON READMISSION

by Keri Annalyn Barron

May 2017

The purpose of this study was to explore the relationship of adherence to evidence-based guidelines for pharmacologic management by select Mississippi hospitals and their hospital readmission rates. This was an exploratory study with a retrospective design. This design offered insight into the relationship between readmissions of heart failure patients and adherence to the national guidelines for the pharmacologic treatment of heart failure. The study took place in a hospital in the southeastern section of the United States. Data were collected from a database of patients with heart failure seen between January 2011 and June 2014.

The unit of analysis for this study was the hospitalizations of the heart failure patients. The researcher limited the study to the first 30 days of the patient's index hospitalization and readmissions included in that period. Patient inclusion criteria for this study included: 18 years of age and older with a diagnosis of heart failure as identified by the International Classification of Disease (ICD – 9) Codes for heart failure. A researcher generated data abstraction tool was used to collect data on the variables of interest: demographic variables and clinical variables. A total of 31 charts comprised the sample. The Statistical Package for the Social Science (SPSS) software version 23 was used to analyze collected data.

The overall findings of this study indicated that patients frequently readmit to the hospital within 30 days of discharge; however, a relationship was not seen between evidence-based pharmacological therapy and readmission. The researcher concluded that this finding was due to the small amount of data for analysis. The results also revealed that some of the pharmacological classes of medications were not utilized, or insufficient documentation existed about their use or lack thereof.

ACKNOWLEDGMENTS

I would like to give special thanks to Dr. Sheila Davis, my dissertation chair, for her knowledge, continued guidance, encouragement, and prayers throughout this dissertation process. I would also like to give special thanks to the members of my dissertation committee: Drs. Bonnie Harbaugh, Patsy Anderson, Hwanseok Choi, and Karen Winters. Thank you all for your knowledge and involvement to help transform this dissertation into an ongoing study that aspires to become valuable.

DEDICATION

I give special thanks to my family and husband for their continuous prayers and words of encouragement throughout this rigorous process. They have been with me since journey began, and they know well the joys and frustrations I have encountered. Throughout it all, they continued to be there for me and continued to inspire me to reach my goal. I continue to appreciate their support immensely.

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LIST OF ABBREVIATIONS

AA	Aldosterone Antagonist
ACCF	American College of Cardiology Foundation
ACEI	Angiotensin-Converting Enzyme Inhibitor
AHA	American Heart Association
AHRQ	Agency for Healthcare Research and Quality
ANOVA	Analysis of Variance
ARB	Angiotensin-Receptor Blocker
ATLAS	Assessment of Treatment with Lisinopril and Survival Trial
BACH	Biomarkers in Acute Heart Failure
BB	Beta Blocker
CHARM	Candesartan in Heart Failure: Assessment of Reduction in Mortality and Morbidity
CINAHL	Cumulative Index to Nursing and Allied Health Literature
CMS	Centers for Medicare and Medicaid Services
CRT	Cardiac Resynchronization Therapy
DRG	Diagnosis-Related Group
EF	Ejection Fraction
ELITE II	Elderly Losartan Heart Failure Survival Study
EMPHASIS	Eplerenone in Patients with Systolic Heart

	Failure and Mild Symptoms Study
EPHESUS	Eplerenone Postacute Myocardial Infarction Heart Failure Efficacy and Survival Study
GWTG	Get with the Guidelines
GWTG-HF	Get with the Guidelines – Heart Failure
HART	Hart Failure Adherence Retention Trial
HYD/ISDN	Hydralazine/Isosorbide Dinitrate
I-PRESERVE	Irbesartan in Patients with Heart Failure and Preserved Ejection Fraction
ICD	Implantable Cardioverter-Defibrillators
ICD – 9	International Classification of Disease
IPPS	Inpatient Prospective Payment System
IRB	Institutional Review Board
MEMS	Medication Event Monitoring Systems
NHLBI	National Heart, Lung, and Blood Institute
RALES	Randomized Aldactone Evaluation Study
USM	The University of Southern Mississippi
Val-HeFT	Valsartan Heart Failure Trial

CHAPTER I – STATEMENT OF THE PROBLEM

Heart failure is a disease often associated with undesirable outcomes: a decrease in health and death. A national health care issue, this disease affects myriad individuals whose treatment costs often prove staggeringly high (Centers for Disease Control and Prevention, 2013). During onset of heart failure, the heart loses its capability to supply the body with an adequate blood supply. As a result, patients lose their ability to engage in daily functions (American Heart Association, 2015a). By the year 2030, heart failure will cost the United States an estimated \$77.7 billion dollars in direct medical costs (Heidenreich et al., 2011, p. 935). Hospital costs related to this disease's management contribute to a major portion of overall hospital expenses (O'Connell, 2000, p. III-7). A heart failure hospitalization can cost as much as \$25,000 and can rise by hundreds of dollars with each intervention utilized, such as nursing, pharmacotherapy, and/or medical procedures (Titler et al., 2008; Wang, Zhang, Ayala, Wall, & Fang, 2010).

The lifetime costs associated with the disease are extreme as well. Heart failure patients can incur lifetime management costs up to approximately \$118,000. Most of these costs are incurred during patients' hospital stays. Indeed, hospital costs can reach approximately \$84,000 per patient (Dunlay et al., 2011, p. 68). The average cost of stay for a heart failure patient readmitted within 30 days of discharge is \$13,000 (Qasim & Andrews, 2012, p. 3). For this reason, the Center for Medicare and other agencies have instituted policies to restrict payment to healthcare institutions (Medicare.gov, n.d.).

While many evidence-based strategies explore ways to reduce these readmissions, healthcare facilities disagree about the strategies used to reduce readmissions. Shan, Finder, Dichoso, and Lewis (2014) reported that even though there are interventions

favorable to the reduction of heart failure readmissions, such as the transition of care, managing medications, discharge planning, and follow-up care, hospitals still have issues with implementation of interventions or an absence of interventions altogether. As a result, heart failure readmissions remain unacceptably high. Hospitals must be able to implement these interventions to reduce heart failure readmissions.

Heart failure affects individuals across all ethnic/racial and age groups. The numbers of individuals affected by heart failure are in the high millions (National Heart, Lung, and Blood Institute, 2012, p. 5). African Americans are at the top of the list for the incidence of heart failure. Hispanics and Caucasians are next, followed by Chinese Americans (Bahrami et al., 2008, pp. 5-6). Caucasian males are at an increased risk of developing heart failure relative to African American males due to health-related factors, such as obesity, high blood pressure, and heart attack (Huffman et al., 2013, p. 1510). Although Caucasian males experience an increased risk of developing the disease, African-American males over age 60 suffer increased incidence. This is in part due to African American males suffering greater risk factors that affect the heart's blood vessels, such as hypertension and diabetes (Loehr, Rosamond, Chang, Folsom, & Chambless, 2008, p. 1019).

In Mississippi, heart failure is a particularly significant issue. While chronic disease accounted for 41.2% of hospital discharges in Mississippi in 2010, heart failure was the most prevalent of the top three chronic diseases cited for discharges. The other two chronic diseases were chronic obstructive pulmonary disease and diabetes mellitus. These discharges accounted for approximately \$289,000,000 in hospital charges (Short,

2014, p. 9). Vital records between 1999-2010 revealed Jackson, Mississippi, to have the most heart failure-related deaths (Snyder et al., 2014, p. 5).

Heart Failure Readmissions

Readmissions of discharged patients affect all healthcare institutions in the United States, as readmissions consistently increase healthcare costs. The Centers for Medicare and Medicaid Services (CMS) (2014) defines readmissions as “an admission to a subsection (d) hospital within 30 days of discharge from the same or another subsection (d) hospital.” Subsection (d) hospitals are Medicare hospitals that receive payment from the Inpatient Prospective Payment System (IPPS), a system that pays based on a patient’s diagnosis-related group (DRG) (Centers for Medicare and Medicaid Services, 2016a, 2016b). Despite penalties imposed by CMS, patient readmissions during unacceptable time periods have not significantly abated in all states. Indeed, Mississippi’s readmissions remain at unacceptable levels.

CMS monitors the number of readmissions to healthcare institutions yearly across the U.S. and has determined the national readmission rate for heart failure to be 22% (Data.medicare.gov, 2015a). In 2011, congestive heart failure was cited as the principal diagnosis for patient readmissions in the United States. Congestive heart failure accounted for 134,500 patients’ readmissions within 30 days of their initial hospital release. Those repeat visits resulted in \$1.7 billion dollars in healthcare costs (Hines, Barrett, Jiang, & Steiner, 2014, p. 3).

While data exist that explicate Mississippi readmissions data, inclusive of hospital guidelines to reduce heart failure readmissions, comparative data are not available that inform about how Mississippi hospital medication guidelines compare with national

evidence-based practice educational guidelines for reducing heart failure readmissions. Evidence-based practice is the application of best available researched evidence into practice (Grimmer, Bialocerkowski, Kumar, & Milanese, 2004, p. 189). Evidence-based practice guidelines are recommendations supported by research that guide clinicians during patient care (Graham, Mancher, & Wolman, 2011). McKenna, Ashton, and Keeney (2004) reported that evidence helps to provide quality health service; however, barriers prevent the best evidence's translation to practice. Some of these barriers include little relevance to utilize research into practice, lack of a facilitator to influence change and having already to remain aware of current changes in healthcare (p. 186-188).

Several clinical practice guidelines assist in the care of patients with heart failure: (a) the 2013 American College of Cardiology Foundation/American Heart Association Guideline for the Management of Heart Failure (ACCF/AHA), (b) the Heart Failure Society of American Heart Failure Guidelines, and (c) American Heart Association Get with the Guidelines-Heart Failure (AHA, 2015b; Lidenfeld et al., 2010; Yancy et al., 2013). The ACCF/AHA guidelines prove the most commonly used out of the three. No previous studies have compared guidelines for treating heart failure with practices used by health care professionals for treating heart failure in Mississippi. Also, there is a lack of comparative data to determine whether a relationship exists between evidence-based pharmacological treatment and readmissions of patients with heart failure in Mississippi.

Purpose of the Study

The purpose of this study was to explore the relationship of adherence to evidence-based guidelines for pharmacologic management by select Mississippi hospitals and their hospital readmission rates, particularly as these factors relate to heart failure.

Research Questions

This study's research sought to determine the relationship between adherence to pharmacological clinical practice guidelines for heart failure patients and readmissions to select Mississippi hospitals within 30 days or fewer after discharge.

The following questions guided this study:

1. To what extent are select Mississippi hospitals adhering to evidence-based pharmacological management guidelines for management of heart failure?
2. What is the relationship between adherence to guidelines for pharmacologic management of heart failure and readmission in Mississippi hospitals?

Theoretical Framework

The care of heart failure patients and reduction of readmissions requires an ongoing relationship between the healthcare system, healthcare system providers, and patients who are supported by evidence-based practice. Wagner's Chronic Care Model (Wagner, Austin, & Korff, 1996) and the theoretical concepts of Donabedian's Quality of Care Framework (Donabedian, Wheeler, & Wyszewianski, 1982) combined to form this study's theoretical framework.

The Chronic Care Model is composed of six components that intend to address inconsistencies that sometimes occur in management of patients with chronic disease. These components focus on the care received within the hospital, as well care provided in the community. First, the model examines the healthcare organization and structures within the organization that impact care provided to chronically ill patients. Inclusive are the systems used to monitor the care of the patients, the mechanisms physicians use to guide treatment, and the care the patients receive. Secondly, the model incorporates

resources in the community that would encourage self-management (Wagner et al., 2002, p. 70).

Wagner et al. (1996) conducted a meta-analysis to examine the common characteristics among programs, randomized controlled studies, and interventions in other countries that were successful in the management of chronic illness. Wagner et al. (1996) determined that those programs, studies, and interventions were successful because they shared common several key factors. They followed plans and protocols, met the needs of the patients through follow-ups, resources, and the provision of more time if patients needed it, paid attention to changes in their patients, provided experts available when needed, and offered necessary information systems (p. 518).

The ACCF and AHA have determined through evidence-based research that their heart failure guidelines can influence the health status of heart failure patients. The researcher submits that Wagner's Chronic Care Model appropriately undergirds this proposed study based upon the six constructs of the model. These constructs provide a means for understanding evidence-based guidelines in treating heart failure. Stated differently, this study encompasses the importance of following plans and protocols as well as paying attention to patients, promoted via Wagner's research and the use of evidence-based research in practice. The utilization of Wagner's model in the redesign of healthcare protocols has the potential to lead to lower costs and better well-being for chronically ill individuals (Coleman, Austin, Brach, & Wagner, 2009).

Donabedian et al. (1982) described a framework that illustrates the importance of a relationship between the health of the patient, quality of care provided, and the costs associated with that care. This framework further defines quality care as being the care

that yields the greatest expected improvement in the patient's health physically, physiologically, and psychologically (p. 976). As such, Donabedian et al.'s (1982) framework fits the present study because quality care for heart failure patients must incorporate the health of the patient, cost-effective treatments, and quality care. To provide quality care, the researcher submits that healthcare institutions must incorporate evidence-based practice measures into patient care.

Donabedian et al.'s (1982) framework is composed of three parts: structure, process, and outcomes. Structure refers to the setting in which the patient receives care. The process is the actual care that the patient receives, and the outcome is the result of the patient's health status after receiving care (Schroeder et al., 2006). The utilization of outcome as a measure of quality is an accepted measure in many cultures. Improved health is always a welcomed outcome, and the outcomes become more consistently valid because they can be measured repeatedly. Thus outcomes can continually validate whether healthcare measures are effective (Donabedian, 2005, pp. 693-694). Donabedian et al.'s (1982) framework fits this study because its constructs guides the researcher's understanding of outcomes and how to use readmission outcomes as a means to measure evidence-based heart failure guidelines in practice.

Definition of Terms

Theoretical Definitions

The following terms were utilized in this project:

1. Heart Failure: is the heart's inability to pump oxygen-rich blood (Chen, 2014).

Heart failure is a serious condition that affects the left/right or both sides of the heart. Right-sided heart failure interferes with the heart's ability to

adequately profuse the lungs with oxygen. Left-sided heart failure interferes with the lungs' ability to adequately profuse the body with oxygen (National Heart, Lung, and Blood Institute [NHLBI], 2014).

2. Evidence-based practice: the incorporation of research supported by evidence, practice, and patients' perspectives to improve clinical decisions for patients (Agency for Healthcare Research and Quality [AHRQ], n.d.). Research methods conducted by nurses, clinicians, and other healthcare disciplines, including quasi-experimental designs, descriptive research, qualitative research, randomized controlled trials, and expert opinion are employed for clinical practice (Puddy & Wilkins, 2011; Titler, 2008). The integration of all these components into clinical decision-making enhances opportunities for patients to receive better quality of life and clinical outcomes ("Introduction to Evidence-Based Practice," n.d.).
3. Hospital readmission: a repeat admission to a hospital before being out of the hospital for 30 days (Centers for Medicare and Medicaid Services [CMS], 2014).
4. National guidelines for treating heart failure: evidence-based guidelines that guide healthcare providers in their decisions about managing heart failure (Lidenfield et al., 2010; Yancy et al., 2013).

Operational Definitions

For the purposes of this study the following operational definitions were employed:

1. Heart Failure: the primary diagnosis associated with patients' readmissions. A diagnosis of heart failure will be identified using the patients' admission diagnosis and/or an ICD-9 code as displayed in Table 1.
2. Readmission: For this study, readmissions were defined as a subsequent hospital admission within 30 days of, discharge as identified by the healthcare institution's medical records database.
3. Pharmacological guidelines for treating heart failure: The ACCF/AHA guidelines for pharmacological management of heart failure are listed in Table 2.

Table 1

ICD – 9 Codes for Heart Failure

ICD-9 CODE	ICD-9 CODE DESCRIPTION
428.0	CONGESTIVE HEART FAILURE UNSPECIFIED
428.1	LEFT HEART FAILURE
428.20	UNSPECIFIED SYSTOLIC HEART FAILURE
428.21	ACUTE SYSTOLIC HEART FAILURE
428.22	CHRONIC SYSTOLIC HEART FAILURE
428.23	ACUTE ON CHRONIC SYSTOLIC HEART FAILURE
428.30	UNSPECIFIED DIASTOLIC HEART FAILURE
428.31	ACUTE DIASTOLIC HEART FAILURE
428.32	CHRONIC DIASTOLIC HEART FAILURE
428.33	ACUTE ON CHRONIC DIASTOLIC HEART FAILURE
428.40	UNSPECIFIED COMBINED SYSTOLIC AND DIASTOLIC HEART FAILURE

428.41	ACUTE COMBINED SYSTOLIC AND DIASTOLIC HEART FAILURE
428.42	CHRONIC COMBINED SYSTOLIC AND DIASTOLIC HEART FAILURE
428.43	ACUTE ON CHRONIC COMBINED SYSTOLIC AND DIASTOLIC HEART FAILURE
428.9	HEART FAILURE UNSPECIFIED

Adapted from Centers for Medicare and Medicaid Services, n.d.

Table 2

Stages of Heart Failure

Stage	Pharmacological Guideline
STAGE A - at risk for heart failure - has conditions such as high blood pressure or diabetes	<ol style="list-style-type: none"> 1. Treatment with an angiotensin-converting enzyme inhibitors (ACEI) or angiotensin receptor blockers (ARB), as appropriate, to control the conditions that might contribute to heart failure. 2. Treatment with statins, as appropriate, in these patients as well.
STAGE B - at risk for heart failure due to heart disease - no signs and symptoms of heart failure present	<ol style="list-style-type: none"> 1. An ACEI or ARB is recommended, as appropriate, to prevent heart failure 2. Beta-blockers (BB) are recommended, as appropriate, to prevent heart failure. 3. Statins are recommended, as appropriate, in patients with a history of heart attack to prevent heart failure. 4. ACEIs and BBs are recommended, as appropriate, with an ejection fraction (EF) < 35% to prevent heart failure
STAGE C - heart disease present - has signs and symptoms of heart failure presently or in the past	<p>Reduced EF</p> <ol style="list-style-type: none"> 1. An ACEI, ARB, or BBs recommended if appropriate. 2. Diuretics are recommended, as appropriate, to relieve fluid retention. 3. Aldosterone antagonists (AA) are recommended, as appropriate, to reduce effects of the disease and the occurrence of death. 4. Hydralazine and Isosorbide Dinitrates are recommended, as appropriate, if the patient cannot tolerate an ACEI or an ARB. 5. Digoxin is recommended, as appropriate, to decrease hospitalization. <p>Preserved EF</p>

	<ol style="list-style-type: none"> 1. ACEIs, ARBs, and BB can be used, as appropriate, to control blood pressure. 2. Diuretics are recommended, as appropriate, to relieve symptoms of volume overload. 3. AAs may also be used, as appropriate, in heart failure patients to decrease their chance of hospitalization.
<p>STAGE D</p> <ul style="list-style-type: none"> - advanced heart failure or end-stage heart failure - heart failure symptoms occur at rest 	<p>Advanced pharmacological treatment, such as inotropic agents, is recommended for patients in this category.</p>

Adapted from Yancy et al., 2013, p. e284.

Assumptions

The following assumptions applied to this study:

1. Evidence-based guidelines are adhered to in healthcare institutions, especially hospitals.
2. Documentation would be sufficient throughout the patients' medical records thus increasing the probability of sufficient information to be collected and analyzed for this study.

Limitations, Scope, and Delimitations

The primary limitation of this study was the small sample size. The researcher was only able to examine a total of 31 charts, due to chart availability and the limited number of staff available to pull more charts. The results of the study did indicate a possibility of a relationship among the variables if more data were available for analysis. A further limitation of the study was the lack of generalizability beyond the patients included in the sample. This was due to small sample size and the limitation of one setting for data collection. The findings from the study were expected to increase

awareness on the importance of utilizing evidence-based research in the management of heart failure, as well as other diseases. The findings were also expected to illustrate the importance of sufficient documentation in the patients' medical records due to the identification of insufficient documentation while conducting data collection.

Significance of the Study

There is an unfortunate paucity of literature that compares practice patterns at Mississippi hospitals with national evidence-based guidelines for treating heart failure. As mentioned, the prevalence of heart failure in Mississippi is significant. Heart failure has been cited as one of the most prevalent discharge diagnoses in Mississippi, and one of the primary causes of death in Mississippi patients. There are data that explicate Mississippi readmissions data; however, there are not data available to compare guidelines Mississippi hospitals use to reduce admissions with those of national evidence-based practice guidelines.

Findings from the study aspires to offer additional knowledge about gaps in the implementation of clinical practice guidelines in the management of Mississippi patients with heart failure. Further, the study contributes rudimentary data for future research that might inform best pharmacological practices for reducing readmissions among those patients. Finally, the findings of this study informs healthcare practices and possible changes amenable to health policies.

Summary

Chapter I introduced a serious healthcare problem the nation, and particularly Mississippi, faces heart failure. Chapter I also introduced the impact readmissions have on the healthcare system. This chapter provided the initial foundation for this study by

describing the purpose of this study, the research questions used to guide the study, and the theoretical framework used to support the study. The theoretical and operational definitions utilized throughout this study were defined. A description of the assumptions, limitations, and scope were also provided, as well as a description of the study's significance. Chapter II reviews the literature related to the utilization of evidence-based guidelines and readmissions.

CHAPTER II – REVIEW OF LITERATURE

Introduction

This literature review consisted of research related to evidence-based guidelines for the treatment of heart failure, studies related to the utilization of those guidelines, and studies related to heart failure readmissions. Databases and search engines accessed for this literature review included Medline, EBSCOhost, ScienceDirect, Dissertation and Theses, and CINAHL with full text. Research findings were limited to those written in English. Keywords searched included: evidence-based guidelines, heart failure, evidence-based therapies, angiotensin-converting enzymes inhibitors, angiotensin-receptor blockers, aldosterone antagonists, beta blockers, readmissions, and Mississippi. American College of Cardiology Foundation/American Heart Association Heart Failure

Guidelines

The ACCF/AHA developed a comprehensive set of guidelines to assist health care professionals to manage heart failure patients, which the literature divides into eight sections. Sections one and two introduce the guidelines and define heart failure, respectively. Section three examines the four classifications of heart failure, and section four explores the epidemiology of the disease. Section five discusses the causes of heart failure, divided into cardiac structural abnormalities and other causes. Section six provides recommendations for the patient's initial evaluation as well as the serial evaluations that will follow. Section seven presents the recommended treatment for the disease based on each progressive stage of heart failure. The final section, section eight, describes how to care for a heart failure patient during hospitalization (Yancy et al., 2013, pp. e241-e242).

For the purpose of this study, the researcher explored the pharmacological treatment recommendations for heart failure. The well-being and ability to perform day to day activities of those affected with heart failure are predictors of hospital readmissions (Moser et al., 2009, p. 766). Both the symptoms and management of those symptoms influence the heart failure patient's well-being and ability to function. The care provided embodies the utilization of appropriate treatment for symptoms related to the disease (Ekman et al., 2005, p. 292).

Four primary pharmacological classes are recognized in the ACCF/AHA guidelines for treating heart failure: angiotensin-converting enzymes (ACEIs) inhibitors, angiotensin-receptor blockers (ARBs), aldosterone antagonists (Aas), and beta blockers (BBs). Diuretics, digoxin, and other medications are recommended in patients with advanced disease. There are recommendations that these medications be increased in small doses to achieve optimal guideline-directed medical therapy (Yancy et al., 2013, p. e276).

Angiotensin-Converting Enzyme Inhibitors

ACEIs block the body's production of angiotensin II, which constricts blood vessels. In patients with hypertension, ace inhibitors keep those vessels open because hypertension is a precursor for heart failure. These medications are especially important because they decrease the work requirement in the already weakened heart muscle (Sweitzer, 2003, p. e16). The utilization of these medications has been associated with reduced mortality, hospitalizations, and repeat hospitalizations. The ACCF recommend ACEIs in all patients affected by heart disease in an attempt to prevent heart failure. The

organizations also recommend these medications to prevent symptoms heart failure patients might exhibit (Yancy et al., 2013, p. e261).

Fu et al. (2012) analyzed seven prospective studies to evaluate their prognostic effect on chronic heart failure patients with a preserved EF versus other medications. Researchers found both death due to all-cause and repeat hospitalizations were reduced with the utilization of these medications. They discovered that the majority of the cases were due to hypertension (69%). This was followed by 33.7% of the cases catalyzed by ischemic heart disease and 25.8% of the cases owed to diabetes mellitus.

Sanam et al. (2014) also explored the association between ACEIs and readmissions by examining the prescriptions of patients with heart failure before discharge. Similar results were found in that there was a reduction readmissions and mortality. Shah et al. (2013) contributed to these findings via their study of the effects ACEIs, along with beta blockers, had on patient outcomes. They performed a repeat analysis of the Biomarkers in Acute Heart Failure (BACH) trial, an international prospective study that investigated the presentation of heart failure patients to the emergency room exhibiting shortness of breath (Maisel et al., 2010). It was found that patients had an increased chance of survival if discharged on both medications, with the ace inhibitor serving as the survival agent.

Angiotensin-Receptor Blockers

ARBs are similar to ace inhibitors in that they also regulate the angiotensin II hormone. These medications inhibit the effect of the hormone, thus lessening the adverse effects associated with ace inhibitors (Barreras & Gurk-Turner, 2003, p. 123; Terra,

2003). ARBs are recommended in patients affected by heart disease in an attempt to prevent heart failure and its associated symptoms (Yancy et al., 2013, p. e261).

There are varying reviews of the utilization of the above-mentioned medications. According to previous studies, ARBs are beneficial to heart failure patients when used concurrently with ace inhibitors. There have been limited associations between the sole use of the medications in the reduction of death and repeated admissions to the hospital; however, there are studies that suggest they might benefit patients who are intolerant to ace inhibitors.

Dickstein (2001) reviewed two trial studies, the Elderly Losartan Heart Failure Survival Study (ELITE II) and the Valsartan Heart Failure Trial (Val-HeFT), to examine the effect ARBs had on prevalence of the disease and death. Losartan, an ARB, was compared to captopril, an ACEI, in the ELITE II trial. The Val-HeFT trial investigated valsartan, an ARB, against a placebo. In both trials, the target dose of medication was achieved by more than 75% of the patients. Patients tolerated ARBs in both trials; however, a difference was not seen in death when comparing losartan and captopril in the ELITE II trial. The author did report, however, that patients taking valsartan as opposed to the placebo in the Val-HeFT trial did experience a reduction in hospitalization and death or disease (p. 241).

McMurray (2001) added to this by also reviewing the Val-HeFT and ELITE II trials along with the Candesartan in Heart Failure: Assessment of Reduction in Mortality and Morbidity (CHARM), and the Irbesartan in Patients with Heart Failure and Preserved Ejection Fraction (I-PRESERVE) trial. The same findings were reported as Dickstein (2001) in that the patients in the Val-HeFT and ELITE II tolerated ARB treatment.

Additionally, patients on an ARB in the Val-HeFT trial had a reduction in hospitalizations as compared to those taking a placebo. The CHARM and I-PRESERVE trials are still in their developmental stages but will compare the utilization of an ARB to a placebo. Researchers did report that participants in the Study of Patients Intolerant of Converting Enzyme Inhibitors (SPICE) tolerated candesartan better than an ACEI (pp. 98-100).

Granger et al. (2000) conducted a double-blind randomization study to determine whether patients' intolerant of ACEIs could tolerate ARBs. There were 90 different study sites in seven different countries to obtain a broad perspective, as well as to create a registry of patients who could not tolerate ACEIs. Participants in the study initially received either 4 mg of candesartan or 4 mg of a placebo. The medication dosages were then titrated to 8 mg at 2 weeks and doubled in mg after 4 weeks. If patients continually tolerated the medications, then dosages were increased to 16 mg. The titration of medication from beginning to end lasted a total of 12 weeks. They reported that 82.7% of the participants tolerated the titration of the candesartan and completed the 12-week program. In addition, they reported that patients taking the medication as opposed to the placebo were hospitalized less frequently (18.7% vs 12.8%) (pp. 611-613).

Savarese et al. (2013) conducted a meta-analysis of 26 trials comparing ACEIs and ARBs in patients with high cardiovascular risks but without heart failure. They found that the combination of medications benefited patients with an increased chance of developing the disease. These researchers also reported that the literature indicated ARBs were beneficial in the reduction of mortality and morbidity in patients who experienced a contraindication to ACEIs (pp. 133-140).

Aldosterone Antagonists

Aldosterone antagonists (AA) are diuretics that block the effects of aldosterone in the body, specifically via regulation of fluid volume. This is a major factor in heart failure patients because they are susceptible to volume overload. Spironolactone and Eplerenone are commonly used aldosterone antagonists (Maron & Leopold, 2010, pp. 2-3).

Several studies cite the combination of Aas, BBs, and ACEIs as being beneficial to heart failure patients. Aas are associated with decreases in mortality and re-hospitalizations. Hyperkalemia is an associated drawback to using these medications (Nappi & Sieg, 2011; Rocha & Williams, 2002). The AHA and ACCF recommend Aas in heart failure patients with an $EF \leq 35\%$ to reduce morbidity or mortality. They are also recommended in patients following acute myocardial infarctions that have a reduced EF of 40% or less (Yancy et al., 2013, p. e268).

Marcy and Ripley (2006) reviewed the functions, benefits, and adverse events that might occur while using aldosterone antagonists in heart failure. Spironolactone and eplerenone were identified as the available aldosterone antagonists used in healthcare. The authors reported that Aas are a pivotal part of treatment in conjunction with other heart failure treatments. They reported, as previously cited, that the renal function of heart failure patients and risk of hyperkalemia should be routinely monitored (pp. 49-56).

Miller and Alvarez (2013) reviewed literature in support of Aas and guidelines to support their use. The authors identified three major trials: the Randomized Aldactone Evaluation Study (RALES), the Eplerenone Postacute Myocardial Infarction Heart

Failure Efficacy and Survival Study (EPHESUS), and the Eplerenone in Patients with Systolic Heart Failure and Mild Symptoms Study (EMPHASIS) (p. E49).

Pitt et al. (1999) conducted RALES to determine whether 25 mg of spironolactone affected patients at risk for death with end-stage heart failure. The study included 1663 patients, 822 of which received the initial dose of spironolactone 25 mg daily, and 841 patients receiving the same dosage of a placebo daily. The medication dose was doubled at 8 weeks if the patients tolerated the medication without exhibiting signs and symptoms of hyperkalemia. If the patient did not tolerate the medication, the medication dosage was titrated down to a smaller dose. The study ended when death occurred. The authors reported that spironolactone was associated with the heart failure patients' reduced risk for death by 30% but also reduced the risk of hospitalizations caused by cardiac issues by 35% less than the placebo group. The author also reported that their study further reinforced the premise that ACEIs were insufficient to suppress the aldosterone hormone, but that AAs had a pivotal part of treating heart failure, as well (pp. 709-716).

Pitt et al. (2003) conducted the EPHESUS to evaluate eplerenone and its effect on morbidity and mortality of heart failure patients who had experienced a myocardial infarction. Six thousand six hundred and forty-two patients participated in the study, with 3313 receiving eplerenone and 3319 receiving the placebo. An initial dose of 25 mg was given to the eplerenone and placebo group. The participants also received optimal medications in conjunction with the study meds. The study ended when death occurred among the participants. The authors reported that more deaths occurred in participants who received the placebo than those who received eplerenone. Cardiovascular-related

issues caused death in both groups. The authors reported that participants in the eplerenone group (12.3%) experienced fewer deaths resulting from cardiac causes than participants in the placebo group (14.6%) (pp. 1309-1321).

Zannad et al. (2011) also conducted a study of the drug eplerenone to determine its effect on patients (n = 2,737) with left-sided heart failure exhibiting symptoms. There were two study groups: eplerenone group (n = 1364) and a placebo (n = 1373). The patients also received additional pharmacologic systolic heart failure therapy. Participants initially received a daily dose of 25 mg of eplerenone or the placebo. If the patient tolerated the medication, the daily dosage was doubled. The end point primary outcomes of the study were either death or hospitalization. The authors reported that patients taking eplerenone had a smaller risk of deaths and hospitalizations than those receiving a placebo. There were fewer deaths in the eplerenone group (18.3%) than in the placebo group (25.9%) (pp. 11-20).

Beta Blockers

BBs block beta-adrenergic receptors in the body. They decrease the workload of the heart by slowing the pulse and lowering blood pressure. These medications are a common treatment option for patients with hypertension (AHA, 2015c). They should also be used in conjunction with other medications when treating heart failure (Chavey, 2000; Gheorghiade, Colucci, & Swedberg, 2003). The AHA and ACCF recommend BBs in all patients with an EF < 35%. They are also recommended in patients with a heart attack and an EF < 35% to prevent heart failure (Yancy et al., 2013, p. 261). In previous studies, authors have cited a relationship between BBs and a reduction of mortality, improved quality of life, and a reduction in hospital readmissions.

Chang, Yang, Freeman, Hlatky, and Go (2013) performed a study to determine their effectiveness in patients (n = 668) with heart failure and chronic kidney disease. Pharmacy databases were used to collect data on medication utilization among the participants in the study. Participants were included in the study if pharmacy data revealed BB utilization among patients twelve months or longer. The authors reported that patients beyond 80 years of age seldom initiated the medication, and participants who initiated them into their pharmacotherapy regimen reduced their risk of death and hospitalization (pp. 176-181).

Packer et al. (2001) analyzed the survival rate of patients with end-stage heart failure taking carvedilol. The study's patients (n = 2,289) were divided into a carvedilol (n = 1156) and placebo group (n = 1133). Both groups received a dose of 3.125 mg two times a day for 14 days. Medications dosages were doubled every 2 weeks if the patients tolerated the titrations until the goal of 25 mg twice daily was achieved. Death and risk of death or hospitalization were the end-points of the study. The authors reported that carvedilol was tolerated well by the patients. Patients in the placebo group had to discontinue their treatment early as opposed to patients in the carvedilol because of adverse effects. The authors also reported that adding carvedilol to the patients' medication regimen produced substantial effects towards their survival. The rate of death in patients receiving carvedilol was reduced by 35%. The risk of death and hospitalizations were reduced by 24% (pp. 1651-1657).

Taneva and Caparoska (2016) conducted a study on chronic heart failure patients to determine whether BBs had an impact on death and death and/or hospitalizations

related to cardiovascular issues. One hundred and thirteen patients were evaluated for 2 years. The patients were divided into participants receiving a beta blocker and a control group. Patients in the beta blocker group received a beta blocker along with conventional heart failure therapy. Conventional therapy was the only treatment received in the control group. Conventional therapy included diuretics, cardiac glycoside, and ACEIs. The beta blocker group was further divided into three subgroups with each group receiving a different beta blocker: metoprolol, bisoprolol, and carvedilol. The authors reported that the risk of death was reduced by 34% in the beta blocker group, and the combination of death and/or hospitalization was also reduced by 40% (pp. 94-97).

Gomez et al. (2011) performed a prospective study (n = 1,085) to determine the relationship between death and incidence of disease of heart failure patients with a preserved systolic function and the treatment of BBs. The study took place over a course of 5 years. The medications under review were bisoprolol and carvedilol. Pharmacy databases were utilized to monitor compliance as well as other routine heart failure medications. The authors reported that morbidity, mortality, and hospital admission were all reduced by BBs. Patients with newly diagnosed preserved systolic function and being treated with BBs experienced a reduced risk of death by 28% for those related to all causes and by 41% for those related to the heart. The incidence of the disease was also reduced as evidenced by the reduced risk of hospitalization (24%) and reduced risk of repeat admission to the hospital (23%) (pp. 51-55).

Utilization of Evidence-Based Heart Failure Guidelines and Its Impact on Morbidity and Mortality

Gislason et al.'s (2007) retrospective study evaluated evidence-based pharmacotherapy in heart failure patients. They examined the relationship between initiation, underdosing, or early termination of pharmacotherapy and the underuse of pharmacotherapy. In this study, the medical treatment of adults (n = 107,092) hospitalized for the first time with heart failure and discharged between 1995 and 2004 were reviewed. Medical treatments were examined for BBs, ACEIs and ARBs, spironolactone, and statins. The authors used logistic regression to assess trends between initiation of treatment and patient mortality. Multivariable analysis was used to assess the trends between mortality and break in therapy for 90 or more days. The authors reported an increase in initiation of medical treatment between 1995 and 2004: ACEIs and ARBs (35.9% to 49.6%), BBs (12.1% to 42.7%), spironolactone (9.8% to 24.9%), and statins (2.0% to 26.9%). In addition, clinicians were routinely prescribing medications below the recommended doses and failing to increase the dosages during long-term treatment. The authors also reported that the persistent use of treatment contributed to a decrease in mortality between 1995 and 2003 (38.7% to 34.5%) (p. 739).

Asghar and Rahko (2010) compared adherence to 2005 ACCF/AHA guidelines when utilizing implantable cardioverter-defibrillators (ICD), cardiac resynchronization therapy (CRT), and medication therapy between heart failure clinicians and general cardiologists. The authors retrospectively reviewed charts of adult patients seen in a heart failure clinic (n = 324) or general cardiologist clinic (n = 239) between 2005 and 2006. The authors looked for patients who had chronic left ventricular dysfunction

confirmed by imaging and stage C heart failure. Three hundred and twenty-four charts met criteria in the heart failure clinic, and 239 charts met criteria in the general cardiologist clinic. They reported that both the heart failure clinicians and general cardiologists followed the guidelines for CRT (86% vs. 81%) and placement of ICDs (77% vs. 74%). There was a difference however in the heart failure clinicians and general cardiologists' implementation of guidelines when treating heart failure (97% vs. 82%). Patients receiving guideline-recommended medicines had a > 35% improvement in their EF (pp. 65-69).

Fonarow et al. (2011) investigated the potential impact of failing to comply with guidelines to implementing optimal evidence-based therapies on heart failure mortality. The authors identified six evidence-based guideline-recommended therapies that reduced death in those affected by the disease. The recommended therapies included conventional heart failure therapy along with hydralazine/isosorbide dinitrate, CRT, and ICD. A representative sample of patients (n = 2,644,800) was drawn from inpatient and outpatient heart failure registries as well as studies that examined heart failure quality of care. They compared the patients who were eligible for and treated with the recommended therapies against those patients who were also eligible for treatment but were not treated.

Researchers reported that a significant number of eligible patients did not receive the recommended therapies. A significant number of eligible patients did not receive hydralazine/isosorbide dinitrate (92.7%) while the lowest number of eligible patients did not receive recommended BBs (14.4%). Additionally, a significant number of eligible patients did not receive an ACEI or an ARB (20.4%), an AA (63.9%), CRT (61.2%), or

ICD (49.4%). The results indicated that full implementation of all six therapies had the potential to prevent 67,996 deaths a year, and the implementation of evidence-based BBs alone had the potential to prevent 21,357 deaths (pp. 1025-1027).

Majumdar et al. (2004) examined the benefits of using high-dose ACEIs, BBs, and digoxin in 3,164 patients with advanced heart failure in 19 different countries between 1992 and 1994. Medication utilization was the dividing factor between the groups. Ninety-one percent of the patients analyzed in the study were still on their initial treatment regimen. The results revealed that patients receiving all evidence-based therapies had a reduced rate of death and hospitalization (12%) at 1 year as compared to those who received only low-dose ACEIs. The results also indicated that patients taking only low-dose ACEIs plus digoxin were at an increased risk for all-cause mortality (pp. 694-699).

Yancy et al.'s (2010) prospective study assessed the utilization of ACCF/AHA guideline-recommended therapies in U.S. outpatient cardiology clinics between 2005 and 2007. The authors assessed for the following measurements: (a) pneumococcal vaccines, (b) utilization of isosorbide dinitrate/ hydralazine specifically in Black patients, (c) statin and antiplatelet therapy, (d) cholesterol levels, (e) smoking cessation counseling, and (f) blood pressure controls.

The results of the study showed that the mean adherence for HYD/ISDN was 7.3%, and more than 71% of the outpatient practices failed the HYD/ISDN measurement. Outpatient practices were also significantly deficient in the other measurements. The results ranged from as low as 1.2% for pneumococcal vaccination to 80.8% for blood pressure controls. The results of the study indicated that outpatient practices were

deficient in their conformity to guideline-recommended heart failure therapy and that better processes were needed to promote adherence to guideline-recommended therapy (pp. 255-260).

The first part of this literature review provided an overview of the four pharmacological classes used in the ACCF/AHA's guidelines in disease management. The four classes consisted of ACEIs, BBs, ARBs, and Aas. This section explored the function of each pharmacological class and studies that supported their use in disease management. Studies were also provided on the utilization of the pharmacological classes in treatment and their impact on morbidity and mortality. The second part of the review provided below discussed the guidelines and their impact on hospital admissions and readmissions.

Utilization of Evidence-Based Heart Failure Guidelines and Its Impact on Hospital Admissions and Readmissions

Numerous programs and strategies have been implemented to reduce readmissions; however, the numbers of readmissions in healthcare institutions remain steady. The hospital is a central location for heart failure patients to receive care. Hospitals are sometimes the first stop for patients to receive heart failure diagnostics and to learn about living with heart failure. These offerings are often insufficient. After discharge, patients still need to be monitored and medications should be adjusted accordingly. If evidence-based therapies are not taken into account, patients are put at an increased risk for readmission.

Gheorghiade, Vaduganathan, Fonarow, and Bonow (2013) offered insight into strategies that may help reduce readmissions. They discussed the influence symptoms

had on readmissions, monitoring heart failure patients and their disease, and utilization of evidence-based therapies in their treatment. Further, they classified a low ejection fraction and the symptom of congestion as being high risk for readmission. One can conclude that hospitals could reduce readmissions by performing comprehensive patient assessments to evaluate not only the physical characteristics and comorbidities of the patients but the social circumstances that might contribute to readmissions, as well. The authors submit that though the patient's hospital admission was important, the post-discharge phase was a vulnerable period for the patient. As such, patients and their families play significant roles in bridging that transitional phase between the hospital and home. Through collaborative efforts between the patient and the healthcare team, readmissions are expected to decline (pp. 395-401).

Kociol et al. (2012) explored the national trends of hospitals and heart failure readmissions. One hundred randomly selected hospitals were contacted via telephone that participated in the *Get with the Guidelines-Heart Failure* (GWTG-HF) quality improvement program, the extent to which the program had any impact on the reduction of heart failure readmissions. The program aims to improve the care patients receive in hospitals by supporting consistent use of today's evidence-based research (AHA, 2015b). The survey addressed three vital processes that affect readmissions: (a) the care patients receive while in the hospital, (b) the care patients receive at discharge, and (c) the overall quality of care received. The authors used linear regression to analyze the relationship between those processes and the readmission rates of the surveyed hospitals. Results of the study indicated that the hospitals did participate in strategies to improve inpatient care and the overall quality of care received. The results also indicated care received at

discharge were associated with a reduction of readmission rates (Kociol et al., 2012, pp. 681-685).

Heidenreich et al. (2012) also performed a study to determine whether the program improved processes of care in hospitals that used the program as opposed to hospitals that did not. The hospitals' enrollment period was 2006 to 2007. The study included 4,460 hospitals. Of those 4,460 hospitals included in the study, 215 (5%) of the hospitals participated in the GWTG-HF and the other 4,245 (95%) did not participate in the study.

The hospitals had to address four processes valuable to the treatment of heart failure as determined by CMS; they were (a) assessment of the patient's left ventricular function, (b) use of an ACEI or ARB to treat left ventricular systolic dysfunction or a reduced EF, (c) discharge teaching, and (d) counseling for smoking cessation. The researchers used Pearson χ^2 , Wilcoxon rank-sum tests, and multivariable logistic regression analyses to analyze the data. The results indicated hospitals that participated in the program reflected better scores in regards to the documentation of left ventricular ejection fraction, utilization of recommended medications, and teaching at discharge. A difference was not seen among counseling for smoking cessation between the two sets of hospitals. The results also indicated that hospitals participating in the program had lower all-cause readmission rates than hospitals that did not participate in the program (pp. 37-39).

Yoo et al. (2014) performed a retrospective, observational study to examine whether Korean hospitals adhered to guidelines when treating systolic heart failure. The study population included 1,297 patients with admittance to 23 university hospitals in

2009. The authors determined compliance by assessing for the use of three pharmacological classes: (a) ACEI/ARB, (b) BB, and (c) AA. They also examined the clinical outcomes of the patient, which included (a) 90-day mortality, (b) 1-year mortality, (c) re-hospitalizations, and (d) mortality and re-hospitalizations. The study population was divided into two groups: patients with good guideline adherence and patients with poor guideline adherence. The authors defined good guideline adherence as the utilization of greater than or equal to 50% of the pharmacological classes, while bad guideline adherence involved utilization of less than 50% of guideline adherence to the pharmacological classes.

The results of the study were as follows: (a) ACEI or ARB were adhered to the most in treatment at 89.7%; (b) BB's were second to be adhered to at 69.2%; and (c) the AA's were third to be adhered to at 65.9%. Results indicated that overall there was good adherence to the three pharmacological classes. Patients with good guideline adherence enjoyed a survival rate of 96.7% and a re-hospitalization rate of 62.3%, as opposed to patients with bad guideline adherence who experienced a survival rate of 89.8% and a re-hospitalization rate of 56.4% (Yoo et al., 2014, pp. 1-7).

Krantz et al.'s (2011) prospective study examined evidence-based heart failure medications in hospitalized patients from admission to discharge in an attempt to reduce death and hospitalizations. The study population consisted of 9,474 patients admitted to hospitals enrolled in the GWTG program. Researchers assessed for the utilization of three pharmacological classes: ACEIs/ARBs, BBs, and Aas. Prior to hospital admission, a significant number of patients were eligible for recommended therapies. Ninety-three percent of the patients met eligibility for a BB. This was followed by more than 70% of

the patients being eligible for the two remaining pharmacological classes. During hospital admission, 72.6% of eligible patients were given BBs, and an ACEI /ARB was also administered to 65.3% of the eligible patients. Aldosterone antagonists were the least pharmacological class given to eligible patients at 15.6%. More than 90% of the eligible patients received a BB or an ACEI/ARB at discharge. The least number of eligible patients (32.2%) received an AA. The initiation of the three pharmacological classes at admission were predictors of continued use at discharge of the patients (pp. 1818-1823).

Calvin et al. (2012) reported the results of the Heart Failure Adherence Retention Trial (HART), which studied the adherence of both physician and patient to evidence-based guidelines for heart failure. Two classifications of medications were primarily examined: (a) ACEI/ARBs, and (b) BB. They defined physicians as being non-adherent if any of those medications were prescribed when contraindicated, or physicians failed to prescribe any of those medications to patients without contraindications. The authors determined patient adherence by using MEMS electronic pills caps to measure the number of times patients opened their medication bottles and by comparing those numbers to medication regimens prescribed by the physician. Patients were considered adherent if they took their medication more than 80% of the time.

The study consisted of 692 patients recruited from hospitals throughout the greater Chicago area. Patients were recruited with a systolic dysfunction or EF of less than 40%. The authors reported that 63% of physicians were adherent to guidelines when treating heart failure. There were more patients with contraindications on therapies than those without contraindications that should have been recommended therapies. BBs were

prescribed to 35 out of 51 (68.6%) patients with contraindications and ACEIs/ARBs were prescribed to 40 out of 54 (74.1%) patients with contraindications. The authors also reported that 213 out of 581 (37%) patients did not consistently take their prescribed medications; however, the overall non-adherence rate for both physicians and patients was 59%. An interesting finding of the study was that minority status of the patients was associated with their non-adherence. Physician non-adherence was associated with four factors: minority status of the patient (which was not defined in the study), comorbidities of the patients, age of the patients, and advanced stages of heart failure (Calvin et al., 2012, pp. 73-78).

Summary

This literature review discussed research related to evidence-based guidelines for the treatment of heart failure, studies related to the utilization of evidence-based guidelines in the treatment of heart failure, and studies related to heart failure readmissions. The literature review provided research that supported the utilization of evidence-based pharmacologic treatment in practice and its impact on patients' outcomes (Asghar & Rahko, 2010; Calvin et al., 2012; Fonarow et al., 2011; Gislason et al., 2007; Majumdar et al., 2004; Yancy et al., 2010). Asghar and Rahko (2010) and Yancy et al. (2010) specifically looked at the utilization of ACCF/AHA pharmacological guidelines in the pharmacological treatment of heart failure patients. Though research demonstrated positive outcomes for patients receiving evidence-based pharmacotherapy, researchers reported varying degrees of conformity to use of evidence-based guidelines in practice. Several studies in the literature occurred in hospitals and clinics in the United States and other countries. The limitation of this review was the lack of research on utilization of

the guidelines in the state of Mississippi. This finding supports the study's research question of determining to what extent are Mississippi hospitals adhering to evidence-based pharmacological management guidelines for the management of heart failure.

Pharmacologic treatment not specific to the ACCF/AHA guidelines was also explored. The authors reported that patients did receive an initial treatment of evidence-based pharmacotherapy; however, some clinicians did not increase doses as recommended. In addition, some patients eligible for evidence-based pharmacotherapy did not receive them.

Gislason et al. (2007) evaluated evidence-based pharmacotherapy in heart failure patients and discovered that patients received insufficient dosages of the recommended therapies. The authors also reported that the initial dosages remained the same onward. Another key finding the authors reported in the study were that age, living arrangements, and socioeconomic factors all played a part in medication persistence. Patients of advanced age and who lived alone reflected poorer medication persistence. Additionally, the socioeconomic factor of increased medication costs also contributed to medication persistence (p. 739)

The study completed by Majumbar et al. (2004) produced similar results in regards to medication dosages. The authors performed a secondary analysis of the Assessment of Treatment with Lisinopril and Survival Trial (ATLAS), a study that examined the effect low and high doses of ACEIs had on death and incidents of the disease (Packer et al., 1999). The results of the study showed that patients receiving higher doses of ACEIs along with the evidence-based dosages of other heart failure

therapies had greater benefits, such as a reduction in mortality or hospitalization (pp. 697-701).

Fonarow et al.'s (2011) study did not offer probable explanations as to why there was not conformity to evidence-based heart failure therapies; however, the study quantified current treatment gaps and the number of preventable deaths with the implementation of therapies. The authors reported that a significant number of eligible patients (n = 2,644,800) were not being treated with the recommended ACEIs/ARBs (n = 501,767), BB (n = 361,809), or Aas (n = 385,326). The numbers were also significant for the number of deaths related to not receiving the recommended therapies. The authors reported that the deaths of these patients (n = 67,996) be prevented if patients received the optimal implementation of guideline-recommended treatment (pp. 1025-1027).

Several of the studies supported the premise that evidence-based therapies in the management of heart failure patients were able to increase survival rates and reduce hospital readmissions (Gheorghiade et al., 2013; Heidenreich et al., 2012; Kociol et al., 2012; Krantz et al., 2011; Yoo et al., 2014). Heidenreich et al. (2012), Kociol et al. (2012), and Krantz et al. (2011) studied the impact using the GWTG program had on readmissions and reported that use of the guidelines contributed to the reduction of heart failure readmissions. Calvin et al.'s (2012) study focused on physician and patient adherence to evidence-based guidelines in the Chicago area. The results indicated the both patients and physicians had an issue with adherence to guideline-recommended therapies.

Overall, the literature lacks research about the evidence-based pharmacotherapy used to treat heart failure patients in Mississippi. Identifying whether Mississippi heart

failure patients are receiving evidence-based therapies might be the start to filling the gap regarding the utilization of evidence-based pharmacotherapy in Mississippi. This understanding might help guide development of strategies for encouraging adherence to practice guidelines with the possibility of curbing costs associated with readmission rates of Mississippi heart failure patients. Studies in different geographic regions are also important because they can help identify the needs of patients and physicians specific to those regions. Information from that study can also assist in the creation of policies and programs that tailor to the needs of people in those communities (Casper et al., 2010, p. 299).

CHAPTER III - METHODOLOGY

Introduction

Chapter III outlines the steps taken for implementation of the current study. Provided is information on the setting, sample, steps taken to protect participants, data collection techniques, and how data analysis was engaged. The researcher conducted an exploratory study to evaluate the relationship of adherence to evidence-based guidelines for pharmacologic management by selected Mississippi hospitals and their hospital readmission rates. A retrospective design was used in this study, as it offered insight into the relationship between readmissions of heart failure patients and adherence to the national guidelines for the pharmacologic treatment of heart failure.

Setting

The setting for this exploratory study was a 400-bed health care institution located in the southeastern region of the United States. The selected healthcare institution is one of the largest medical systems in that state and region, offering two hospitals and a variety of healthcare clinics. Several other hospitals were approached for inclusion, but a plethora of barriers prevented their participation. Although it cannot be substantiated, it seemed as though a few of the approached hospitals were reluctant to have records evaluated that would have determined their quality of congestive heart failure treatment and care.

Sample

The researcher collected sample data for this study from a database of medical records of patients with heart failure seen between January 2011 and June 2014. The sample data were used to measure adherence to pharmacotherapy recommendations.

This time period was chosen because readmission data received from data.medicare.gov (2015b) specified these date ranges as the dates of analysis for readmissions in Mississippi. Date ranges are also a significant factor in retrospective studies. A 4-year span was chosen to maximize the study's efficacy by increasing the number of hospitalizations that qualified as readmissions. The researcher limited the study to the first 30 days of the patient's index hospitalization and readmissions included in that period.

Patient inclusion criteria for this study included the following components: 18 years of age and older with a diagnosis of heart failure as identified by the International Classification of Disease (ICD – 9) Codes for heart failure (Table 1). ICD-9 codes were used because hospitals did not begin using ICD-10 codes until October 2015. Hospitalizations that met inclusion criteria were identified by a list of 30-day readmissions provided by administrators at the healthcare institution.

The researcher determined through a power analysis 80 medical records would be an adequate sample size for this study. A convenience sample was utilized to select subjects. The researcher was able to collect 31 of the required charts needed for review. This limited number of charts was due to chart availability and the limited number of staff available to pull an adequate number of charts.

Protection of Human Subjects

The University of Southern Mississippi's Institutional Review Board (Appendix B) and the IRB of the selected healthcare institution in Mississippi (Appendix C) approved this exploratory study. There were no known risks to the participants or the information the researcher obtained in this study. The researcher did not recruit any

patients but instead used confidential retrospective data only from medical chart reviews. Data were collected in a private room provided to the researcher by the healthcare institution. This measure reduced the risk of accidentally disclosing confidential information as the medical charts were reviewed. The researcher ensured that data obtained from the records were non-identifiable and kept confidential. The researcher achieved confidentiality by not collecting personal information, such as names, addresses, and/or social security numbers. The researcher also replaced medical record numbers with researcher created identification numbers assigned only for this study. Data were entered the same day it was collected as well as stored on a laptop with password-protected software. The researcher took the protection of data a step further by securing the laptop and data abstraction tool, used to collect data, in a locked file cabinet.

Data Collection

Following USM IRB approval and approval from the selected healthcare institution, data for this study were obtained by the researcher from medical records at the approved healthcare site. The researcher requested permission to access the medical records of patients with the primary admission diagnosis of heart failure. The researcher created a simple data abstraction tool (Appendix A) to collect data on the variables of interest: demographic variables and clinical variables. Data abstraction tools add to the validity of retrospective studies by guiding data collection and ensuring that data is collected in a uniform manner (Schwartz & Panacek, 1996, p. 123). A well-designed data abstraction tool limits the chance of missing data, increases the likelihood accurate data is collected and promotes the analysis of accurate data (Banks, 1998, p. 164). The researcher utilized the data collection tool to determine whether the ACCF/AHA

guidelines were adhered to by seeking documentation that included the four pharmacological classes in the patients' treatment at admission and discharge and then again at the patients' readmission and discharge.

The demographic variables of interest included age, gender, and ethnicity. Age, gender, and ethnicity of the patients were obtained from the patients' admission demographic paperwork. Age was confirmed by the patients' date of birth. Gender was defined as the patients' biological construct: male or female. This information was designated on the patients' chart.

The clinical variables of interest included admission date, discharge date, and readmission date, stage of heart failure, ICD-9 code diagnosis of heart failure, comorbidities (diabetes, hypertension, myocardial infarction, atrial fibrillation, ischemic heart disease, hyperlipidemia, anemia, chronic kidney disease, and chronic obstructive pulmonary disease), height, weight, lab findings (blood urea nitrogen (BUN), creatinine, potassium, brain natriuretic peptide (BNP), hemoglobin a1c, and hemoglobin), admission and discharge vital signs, heart failure medications at index admission/discharge and readmission/discharge, and smoking status (current smoker, past smoker, and never smoked). The researcher also collected the payer sources for this hospitalization of the sample participants, which may include Medicare, Medicaid, private insurances, and non-insured. The data were entered into Excel and imported into a statistical software package for data analysis.

ICD-9 codes were either identified on the patients' demographic admission paperwork or the case manager's discharge planning notes. When the ICD-9 code for heart failure was not available to confirm the patients' diagnosis admission of heart

failure, the researcher then reviewed the physician's dictated history and physical for the inclusion of the diagnosis of heart failure in the reason for admission diagnoses. The researcher used the criteria displayed in Table 2 to determine the stage of heart failure among the patients. The confirmation of stage C heart failure among the patients was confirmed by the emergency room's documentation of the patients' heart failure symptoms exhibited upon admission, as well as the physician's documentation in the history and physical of the patients' heart failure symptoms exhibited upon admission.

Information regarding patients' height, weight, lab values, comorbid conditions, vital signs, and smoking status were obtained from chart reviews. Height and weight were obtained from the patients' admission paperwork. Lab values were obtained at admission from the patients' laboratory paperwork. Index admission and discharge vital signs were obtained at the patients' initial admission from the graphic's section in the patients' chart. The researcher focused primarily on patients' blood pressure and pulse.

The selected comorbid conditions on the data abstraction were identified in the ACCF/AHA guidelines as being comorbid conditions that commonly affect heart failure patients (Yancy et al., 2013, p. e294). The patients' comorbid conditions were obtained from the physician's dictated history and physical, consultation notes, and discharge notes. Smoking status was obtained from the physician's dictation of the patients' smoking status in either the patients' history and physical or consultation notes. The patients' payor sources were also identified by the patients' demographic data.

Finally, the patients' medication information was obtained from the medication lists at admission and discharge and again from the medication lists at readmission. Each class of medication was recognized by utilizing a list created by researcher of commonly

used medications according to each medication class. The referral list is provided in Table 3.

Table 3

Common Heart Failure Medication Classes

ACEI	BB	ARBS	AA
- end in pril	- end in lol	- end in tan	
Benazepril (Lotensin)	Acebutolol (Sectral)	Candesartan (Atacand)	Eplerenone (Inspra)
Captopril (Capoten)	Atenolol (Tenormin)	Eprosartan (Teveten)	Spironolactone (Aldactone)
Enalapril (Vasotec/Epaned)	Betaxolol (Kerlone)	Irbesartan (Avapro)	
Fosinopril (Monopril)	Bisoprolol Fumarate (Zebeta)	Losartan (Cozaar, Hyzaar)	
Lisinopril (Prinivil/Zestril)	Carvedilol (Coreg)	Olmesartan (Benicar)	
Moexipril (Univasc)	Esmolo (Brevibloc)	Telmisartan (Micardis)	
Perindopril (Aceon)	Lebetalol (Trandate)	Valsartan (Diovan)	
Quinapril (Accupril)	Metoprolol (Lopressor)		
Ramipril (Altace)	Nadolol (Corgard)		
Trandolapril (Mavik)	Nebivolol (Bystolic)		
	Penbutolol (Levalol)		
	Propranolol (Inderal LA, Inderal XL)		

Adapted from American College of Cardiology, n.d.; Ogburn, 2016a, 2016b, 2016c.

Data Analysis

The researcher used the Statistical Package for the Social Science (SPSS) software version 23 to analyze the collected data. Statistical analysis of the data helped the researcher answer the study's research questions by (a) determining the extent to

which select Mississippi hospitals adhering to evidence-based pharmacological management guidelines for management of congestive heart failure, and (b) determining the relationship between adherence to guidelines for pharmacologic management of heart failure and readmission to hospital for select Mississippi hospitals.

First, the researcher utilized descriptive statistics to analyze the patient's demographic data. Examples of descriptive statistics used in this study are the measures of central tendency and frequency distribution. Mean was the primary measure of central tendency used in this study. The measures of central tendency provide an overall description of the sample's average age, gender, and race (LoBiondo-Wood & Haber, 2010, pp. 314-315). The frequency distribution displays the number of times (and percentage) each of the pharmacological classes was noted in the patients' medication list at the index admission and discharge and readmission.

The researcher also utilized inferential statistics to analyze the collected data. Inferential statistical analysis helped the researcher determine if there is a relationship or difference between variables. Research question one and two analysis consisted of a t-test and independent samples t-test. In this study, the researcher is trying to determine whether the utilization of evidence-based heart failure pharmacologic guidelines have an impact on heart failure readmissions.

CHAPTER IV – DATA ANALYSIS

Introduction

The purpose of this study was to explore the relationship of adherence to evidence-based guidelines for pharmacologic management by selected Mississippi hospitals and their hospital readmission rates. Chapter II discussed the literature supporting adherence to evidence-based guidelines and the impact it had on readmissions. Chapter III discussed the methods used to collect data and introduced the statistics that would be used with the Statistical Package for the Social Science to analyze the data. Chapter IV presents the results of data analysis. The unit of analysis for this study was the re-hospitalizations of the heart failure patients.

Description of the Sample

A total of 31 charts were available for review. The limited number of charts was due to lack of chart availability and limited staff available to pull additional charts. Descriptive statistics were generated to describe patients whose records were included in the analyses. The mean age of patients at admission was 77.7(SD = 11.3) years. Frequencies were generated to describe the sex and race of the patients. The study included 15 females and 16 males. The study consisted of 24 Caucasians, 6 African Americans, and 1 American Indian.

Clinical Data

Frequencies and percentages were generated to describe the admitting diagnoses based on ICD-9 codes or presentation of symptoms discussed in chapter I and III. Only 6 (19.4%) of the patients in the study had an ICD-9 code documentation of heart failure.

The other 25 (80.6%) patients had a confirmed diagnosis of heart failure by physician documentation.

All of the patients (N = 31) in this study were identified as having stage C heart failure, or as having the presence of heart disease while exhibiting the symptoms of heart failure. Means and standard deviations were generated to describe the weight in kilograms, the height in inches, blood pressure (mmHg), and pulse. The mean height was 67.65 (SD = 3.77) inches and the mean weight was 89.23 (SD = 26.40) kilograms.

The review of vital signs is an integral factor in the management of heart failure because they help to determine whether the patient's hypertension is adequately controlled. Uncontrolled hypertension is one of the risk factors for heart failure as well as one of the factors that can lead to worsening heart failure (Dumitru & Baker, 2016).

The mean systolic blood pressure upon admission was 140.45 (SD = 33.48). The mean diastolic blood pressure upon admission was 69.34 (SD = 20.54). The mean pulse upon admission was 83.77 (SD = 22.58). The mean systolic blood pressure upon discharge was 133.32 (SD = 20.11). The mean diastolic blood pressure upon discharge was 67.39 (SD = 13.88). The mean pulse upon discharge was 72.90 (SD = 15.90). The results are presented in Table 4.

The frequency of lab values upon admission and discharge were analyzed to assess an overview of the patients' labs present at admission and discharge. The review of lab values is pertinent in the treatment of heart failure because they help to monitor whether other vital organs, such as the kidneys, are being affected (AHA, 2016). The review of lab values is also important because they relate to whether a patient's comorbid conditions are under control, which also has an influence on readmissions. If a patient's

comorbid conditions are not adequately controlled, then that can influence the patient's heart failure disease and thus increase the chance of readmission.

The labs analyzed were BUN, creatinine, BNP, potassium, HgA1C, and hemoglobin. BUN and creatinine are labs used to monitor kidney function (Table 3). The kidney function of heart failure patients is especially important because some heart failure medications can alter their renal function (Konstam, 2011; Metra, Cotter, Gheorghiade, Cas, & Voors, 2012).

BNP is a significant lab when treating heart failure because it measures how the heart is functioning (Doust, Lehman, & Glasziou, 2006). Potassium is an important lab to measure because some heart failure medications predispose patients to hyperkalemia. HgA1C is a lab used to monitor whether a diabetic patient's blood sugar levels are adequately controlled. Diabetes can predispose a patient to diabetes as well as worsen heart failure in those affected by the disease (Cas et al., 2015). Finally, it is important to monitor the hemoglobin levels of heart failure patients because they are at an increased risk for anemia especially when the patient has kidney disease (Anand, 2008; Tang & Katz, 2006). The analysis of admitting lab values is presented in Table 4.

Table 4

Lab Values

	N	Mean (SD)
BUN	31	43.23 (29.28)
Creatinine	31	2.27 (1.20)
BNP	30	858.03 (757.98)
Potassium	30	4.39 (0.69)
HgA1C	31	89.99 (27.98)
HgB	31	10.52 (2.51)

The frequency of the comorbid conditions among the patients was also analyzed. Many heart failure patients have other comorbid conditions that either predisposed them to heart failure or occurred as a result of the disease. Healthcare professionals have to concurrently treat the patient's heart failure as well as the comorbid condition(s) to decrease the worsening of the disease. The lack of inclusion of a variety of comorbid conditions in the study of heart failure has been cited as a potential limitation in the sufficient management of the disease (Yancy et al., 2013, p. e299).

The insufficient inclusion and treatment of comorbid conditions falls under the umbrella of non-adherence when considering the utilization of evidence-based pharmacological guidelines. The guidelines cannot be properly adhered to if the patient's other comorbid conditions are not adequately managed. As stated, some of the patient's comorbid conditions can either predispose them to heart failure if not managed appropriately or can contribute to worsening of the disease. The analysis of comorbid conditions is presented in Table 5.

Smoking status and insurance status of the patients were also analyzed using measures of central tendency. The smoking status of these patients are important to determine whether they were self-promoting a better lifestyle. Current smoking statuses have been associated with worsening disease and a decrease in quality of life (Conard, Haddock, Poston, & Spertus, 2009). Three patients (9.7%) were current smokers, 15 of the patients (48.4%) had never smoked, 11 patients (35.5%) were past smokers, and data was not available for 2 of the patients in the study. The insurances were examined to determine whether they might have an influence on the pharmacological treatments received. The majority of the patients in the study (71.0%) had only Medicare along with

a supplementary private insurance (53.1%). The results of the study showed that 25.8% of the patients had Medicare and Medicaid. Only one patient was identified as being non-insured.

Table 5

Comorbid Conditions

Comorbid Conditions Variables		N	%
Diabetes	Yes	18	58.1
	No	13	41.9
Hypertension	Yes	24	77.4
	No	7	22.6
Ischemic Heart Disease	Yes	16	51.6
	No	15	48.4
Hyperlipidemia	Yes	11	35.5
	No	20	64.5
Anemia	Yes	12	38.7
	No	19	61.3
Chronic Kidney Disease	Yes	19	61.3
	No	12	38.7
COPD	Yes	10	32.3
	No	21	67.7
Atrial Fibrillation	Yes	14	45.2
	No	17	54.8
Myocardial Infarction	Yes	6	19.4
	No	25	80.6

Research question #1 - To what extent are select Mississippi hospitals adhering to evidence-based pharmacological management guidelines for management of heart failure?

The researcher analyzed the frequency of utilization of each pharmacological class upon index admission/discharge and readmission/discharge to answer question one. The results of the analysis indicated that BBs were the most commonly used pharmacological treatments in the management of heart failure. Patients were either prescribed the medication or had sufficient documentation contraindicating the utilization of the medication in their pharmacological management. The frequency of BBs (83.9%) remained the same upon admission/discharge and readmissions/discharge

Table 6

Frequency of Medication Adherence and Non-Adherence

Medication class	Index Admission and Discharge		Readmission	
	Yes	No	Yes	No
ACE Inhibitor	13 (41.9%)	18 (58.1%)	8 (25.8%)	23 (74.2%)
Beta blocker	26 (83.9%)	5 (16.1%)	26 (83.9%)	5 (16.1%)
Angiotensin receptor blocker	10 (32.3%)	21 (67.7%)	7 (22.6%)	24 (77.4%)
Aldosterone inhibitor	8 (25.8%)	23 (74.2%)	10 (32.3%)	21 (67.7%)

Research question #2 - What is the relationship between adherence to guidelines for pharmacologic management of heart failure and readmission to select Mississippi hospitals?

The relationship between adherence to guidelines for pharmacological management and readmission was first examined by examining distribution of readmissions based on days since index admission (see Table 7). The first column represents the number of days since admission the patients were readmitted, and the second column represents the frequency of patients who readmitted on the number of days since admission.

Table 7

Frequency of Readmission Since Discharge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	6.3	6.5	6.5
	3	2	6.3	6.5	12.9
	6	1	3.1	3.2	16.1
	7	3	9.4	9.7	25.8
	8	1	3.1	3.2	29.0
	9	1	3.1	3.2	32.3
	11	1	3.1	3.2	35.5
	12	2	6.3	6.5	41.9
	14	1	3.1	3.2	45.2
	17	3	9.4	9.7	54.8
	22	1	3.1	3.2	58.1
	23	1	3.1	3.2	61.3
	24	2	6.3	6.5	67.7
	26	1	3.1	3.2	71.0
	28	1	3.1	3.2	74.2
	29	1	3.1	3.2	77.4
	30	3	9.4	9.7	87.1
	32	1	3.1	3.2	90.3
	34	1	3.1	3.2	93.5
	36	1	3.1	3.2	96.8
	42	1	3.1	3.2	100.0
	Total	31	96.9	100.0	

Next, a t-test was performed to analyze if there was a difference in the means between the adherence and non-adherence of the four pharmacological classes. Lastly,

the relationship between adherence to guidelines for pharmacological management and readmission was examined using an independent samples t-test looking for a significance level of .05. Each pharmacological class of medication was examined.

There was no significant difference in the scores for ACEI utilization or documentation ($M = 18.92$, $SD = 9.691$) and no ACEI utilization or documentation ($M = 17.56$, $SD = 13.053$); $t(29) = -.319$, $p = .752$. There was no significant difference in the scores for ACEI2 utilization or documentation ($M = 21.00$, $SD = 11.514$) and no ACEI2 utilization or documentation ($M = 17.13$, $SD = 11.718$); $t(29) = -.808$, $p = .426$. There was no significant difference in the scores for BB utilization or documentation ($M = 19.12$, $SD = 11.810$) and no BB utilization or documentation ($M = 13.00$, $SD = 9.925$); $t(29) = -1.803$, $p = .288$. There was no significant difference in the scores for BB2 utilization or documentation ($M = 19.12$, $SD = 11.810$) and no BB2 utilization or documentation ($M = 13.00$, $SD = 9.925$); $t(29) = -1.803$, $p = .288$. There was no significant difference in the scores for ARB utilization or documentation ($M = 16.80$, $SD = 10.465$) and no ARB utilization or documentation ($M = 18.76$, $SD = 12.300$); $t(29) = .434$, $p = .667$. There was no significant difference in the scores for ARB2 utilization or documentation ($M = 14.29$, $SD = 12.216$) and no ARB2 utilization or documentation ($M = 19.25$, $SD = 11.437$); $t(29) = .996$, $p = .327$. There was no significant difference in AA utilization or documentation ($M = 17.38$, $SD = 14.667$) and no AA utilization or documentation ($M = 18.39$, $SD = 10.714$); $t(29) = .210$, $p = .835$. There was no significant difference in AA2 utilization or documentation ($M = 17.60$, $SD = 13.954$) and no AA2 utilization or documentation ($M = 18.38$, $SD = 10.679$); $t(29) = .172$, $p = .864$.

The results of the study indicated no significant relationship between pharmacological management and readmission. This may be due in part to the limited amount of data for analysis. The results suggested a potential difference in readmission with the utilization of ACEI or BB, but that impact can only be determined by an analysis of more data. The results are presented in Tables 8 and 9. The standard abbreviation for each pharmacological class is used to represent the utilization of that pharmacological class at the index admission/discharge. This is followed by the standard abbreviation with the number 2 to represent utilization of that pharmacological class at readmission

Table 8

Multiple T-Test Results

		N	Mean (SD) number of days between discharge and readmission (time)
ACEI	Non-adherent	18	17.56 (13.05)
	Adherent	13	18.92 (9.69)
ACEI2	Non-adherent	23	17.13 (11.72)
	Adherent	8	21.00 (11.51)
BB	Non-adherent	5	13.00 (9.93)
	adherent	26	19.12 (11.81)
BB2	Non-adherent	5	13.00 (9.93)
	Adherent	26	19.12 (11.81)
ARB	Non-adherent	21	18.76 (12.30)
	Adherent	10	16.80 (10.47)
ARB2	Non-adherent	24	19.25 (11.44)
	Adherent	7	14.29 (12.22)
AA	Non-adherent	23	18.39 (10.71)
	Adherent	8	17.38 (14.67)
AA2	Non-adherent	21	18.38 (10.68)
	Adherent	10	1. (13.95)

Table 9

Multiple Independent T-Test Results

Variables	Groups (n)	Mean (SD) number of days between discharge and readmission (time)	Test Statistic (<i>p</i> -value)	95% C.I.	
				LL	UL
ACEI	Non-adherent (18)	17.56 (13.05)	-0.319 (0.752)	-10.316	7.401
	Adherent (13)	18.92 (9.69)			
ACEI2	Non-adherent (23)	17.13 (11.72)	-0.808 (0.426)	-13.665	5.926
	Adherent (8)	21.00 (11.51)			
BB	Non-adherent (5)	13.00 (9.93)	-1.083 (0.288)	-17.669	5.438
	Adherent (26)	19.12 (11.81)			
BB2	Non-adherent (5)	13.00 (9.93)	-1.083 (0.288)	-17.669	5.438
	Adherent (26)	19.12 (11.81)			
ARB	Non-adherent (21)	18.76 (12.30)	0.434 (0.667)	-7.280	11.204
	Adherent (10)	16.80 (10.47)			
ARB2	Non-adherent (24)	19.25 (11.44)	0.996 (0.327)	-5.229	15.158
	Adherent (7)	14.29 (12.22)			
AA	Non-adherent (23)	18.39 (10.71)	0.210 (0.835)	-8.882	10.914
	Adherent (8)	17.38 (14.67)			
AA2	Non-adherent (21)	18.38 (10.68)	0.172 (0.864)	-8.486	10.048
	Adherent (10)	17.60 (13.95)			

Summary

This chapter presented the results of the data analysis. Data results revealed that the majority of these patients had more than one comorbid condition, along with their

primary diagnosis of heart failure. The data results did show that patients frequently readmit to the hospital within 30 days of discharge; however, the results did not illustrate a significant relationship between evidence-based pharmacological therapy and readmission. This may be due to the lack of data. Beta blockers were the most commonly used medication upon admission/discharge and readmission/discharge. The results also showed that some of the pharmacological classes of medications were not utilized, or there was not sufficient documentation explaining why they were not being used. The next chapter will discuss the conclusions and findings of this study, limitations, and recommendations for future research.

CHAPTER V – CONCLUSIONS, FINDINGS, AND RECOMMENDATIONS FOR FUTURE RESEARCH

Introduction

The purpose of this study was to explore the adherence to evidence-based guidelines for pharmacologic management by select Mississippi hospitals and their hospital readmission rates. This was examined by determining to what extent select Mississippi hospitals adhere to evidence-based pharmacological management guidelines for the management of heart failure and by determining the relationship between adherence to guidelines for pharmacologic management of heart failure and readmission to hospital for select Mississippi hospitals. Chapter V will highlight the study's conclusions, findings, limitations, and recommendations for future research on this topic.

Conclusion

The researcher can conclude that the study successfully answered question one; however, question two would require additional data for analysis to determine if there is indeed a significance.

Findings

The overall findings of this study indicated there was no relationship between adherence to evidence-based guidelines for pharmacologic management and readmissions. The first question addressed was: "To what extent are select Mississippi hospitals adhering to evidence-based pharmacological management guidelines for management of heart failure?" Data was collected on a total of 31 patients. The researcher searched the charts to examine the frequency of utilization of the four main pharmacological classes upon admission or discharge. If the medication was not utilized,

the researcher went to the next step of searching for specific documentation contraindicating the use of the medication in the patients' pharmacologic management.

A frequency analysis was used to statistically analyze the extent to which evidence-based guidelines were being adhered to. The results indicated that evidence-based pharmacological medications were either not frequently prescribed or did not have sufficient documentation supporting or contraindicating the utilization of the medication in the patients' pharmacological management. BBs were the only medications identified as being prescribed frequently.

The second research question addressed was: "What is the relationship between adherence to guidelines for pharmacologic management of heart failure and readmission to hospital for select Mississippi hospitals?" First, a t-test was performed to analyze if there was a difference in the mean number of days between adherence and non-adherence of the four pharmacological classes. The results of this test allowed the researcher to determine whether the adherence or non-adherence to each pharmacological class contributed to an increase or decrease in the mean number of days the patients stayed out of the hospital since discharge. An increase in mean number of days in the non-adherent group would indicate not adhering to the pharmacological class was associated keeping patients out of the hospital longer. A decrease in mean number of days in the non-adherent group would indicate not adhering to the pharmacological class was not associated with keeping patients out of the hospital longer.

A similar rationale was applied to the relationship between adherence of pharmacological classes and time. An increase in mean number of days in the adherent group would indicate adhering to the pharmacological class was associated with keeping

patients out of the hospital longer. A decrease in mean number of days in the adherent group would indicate adhering to the pharmacological class was not associated with keeping patients out of the hospital longer.

According to the results of the t-tests, there was not significant difference in time among the pharmacological classes. For example, the patients in the ACEI non-adherent group stayed out of the hospital 17 days before being readmitted. There was not a major difference in the ACEI adherent group because the patients in that group stayed out of the hospital only 18 days before being readmitted. Similar results were seen among the other pharmacological classes. These results indicated to the researcher there was not a relationship between adhering to the pharmacological classes and readmission.

An independent samples t-test was then used to statistically analyze the relationship between adherence to guidelines for pharmacological management and readmission. The results of the study indicated there was not a significant relationship between pharmacological management and readmission. This may be due in part to the limited amount of data for analysis.

Recommendations for Future Research

The utilization of evidence-based interventions is an essential part of quality patient care. Future research of this topic should include a larger sample to determine whether there is any significance between the utilization of evidence-based pharmacologic medications and readmissions. This study was limited to a total of 31 charts, which was due to chart availability and the limited number of staff available to pull more charts. Future studies should also include the incorporation of the patients' comorbid conditions because they also have a significant influence on patient care and

their regimen of medications. Yancy et al. (2013) made reference to the inclusion of comorbid conditions in future studies in their research gaps and recommendations for future research. Several of the studies the authors reviewed excluded patients with conditions limiting their recommendations for these patients (p. e299).

Qualitative studies on this topic would also prove beneficial. Qualitative studies would offer insight from the patients' perspectives on what influences their decision to readmit to the hospital and whether their compliance to their medication regimen influences readmission. Qualitative studies would also offer information on whether patients have a thorough understanding of their disease and the necessary steps to effectively manage it.

Another recommendation would be to use the data collected from this study as a measure of quality assurance in the healthcare facility. This study can be utilized by the staff of the healthcare facility in which the data was collected to measure and improve quality care in the healthcare facility. The data collected from this study could be used specifically as a learning tool to guide healthcare staff about the importance of evidence-based practice and the basis of incorporating evidence-based practice into patient care.

There are also implications for nurses and physicians. While conducting the chart reviews, it was noted that there was not sufficient documentation contraindicating the utilization of evidence-based medications in the patient's care. Healthcare personnel are aware of the importance of documentation; however, sometimes it is important to remind them of the necessity of sufficient documentation. Documentation is an essential part of continuity of care and can also be the difference between saving a person's life. All healthcare members involved in patient care refer to documentation many times before

decisions are made. Nurses are especially aware of the importance of documentation because they are often taught that if a situation is not documented, then that situation did not occur. Thus, sufficient documentation can be the turning point in legal cases concerning patient care.

Summary

This study explored the adherence to evidence-based guidelines for pharmacologic management by select Mississippi hospitals and the potential impact it had on their hospital readmission rates. This was achieved by first determining to what extent a select Mississippi hospital adhered to evidence-based pharmacological management guidelines for the management of heart failure and second by determining the impact adherence to those guidelines had on readmission rates. The results of the study did show a potential impact between adherence to guidelines and readmission rates; however, the results were limited to a potential impact due to the limited amount of data available for data analysis. The study did, however, demonstrate the importance of incorporating evidence-based guidelines into the care patients receive and the importance of thorough documentation.

APPENDIX A – Data Abstraction Tool

Date Data Collected _____

Date Data Entered _____

TITLE

KERI A. BARRON, MSN, RN
DATA COLLECTION FORM

1. Subject ID Number _____

2. Subject medical record number _____

DEMOGRAPHIC DATA

3. Age: _____

4. Gender:

Female _____

Male _____

5. Race/Ethnicity

Caucasian/White _____

African American/Black _____

Hispanic/Latino _____

Asian American/Pacific Islander _____

American Indian _____

CLINICAL DATA

6. Admission date _____

7. Discharge date _____

8. ICD-9 Code _____

9. Stage of Heart Failure

A	_____
B	_____
C	_____
D	_____
10. Height	_____
11. Weight	_____
12. Comorbid Conditions:	
Diabetes	_____
Hypertension	_____
Ischemic Heart Disease	_____
Hyperlipidemia	_____
Anemia	_____
Chronic Kidney Disease	_____
COPD	_____
Atrial Fibrillation	_____
Myocardial Infarction	_____
13. Laboratory Values – Obtained at Admission	
Blood Urea Nitrogen (BUN) (10-20)	_____
Creatinine (0.7-1.3)	_____
Brain Natriuretic Peptide (BNP) (_____
Potassium (3.5 – 5.0)	_____
HgA1c (if diabetic) (3.9 – 6.9)	_____
Hemoglobin (13.5 – 17.5)	_____

14. Vital Signs at Admission

BP

P

15. Vital Signs at Discharge

BP

P

16. Smoking Status

Never Smoked

Current Smoker

Past Smoker

17. Pharmacological Heart Failure Treatment on Admission/Discharge

Angiotensin-converting enzyme inhibitors (Yes or No)

If no, documentation of reason why

Beta blockers (Yes or No)

If no, documentation of reason why

Angiotensin receptor blockers (Yes or No)

If no, documentation of reason why

Aldosterone receptor antagonist (Yes or No) _____

If no, documentation of reason why

18. Pharmacological Heart Failure Treatment on Readmission

Readmission date _____

Angiotensin-converting enzyme inhibitors (Yes or No) _____

If no, documentation of reason why

Beta blockers (Yes or No) _____

If no, documentation of reason why

Angiotensin receptor blockers (Yes or No) _____

If no, documentation of reason why

Aldosterone receptor antagonist (Yes or No)

If no, documentation of reason why

19. Insurance Provider

Medicare

Medicaid

Medicare/Medicaid

Private Insurance

Non – Insured

APPENDIX B – IRB Approval Letter



INSTITUTIONAL REVIEW BOARD
118 College Drive #5147 | Hattiesburg, MS 39406-0001
Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional-review-board

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 16030304
PROJECT TITLE: An Exploratory Study of the Utilization of Evidence-based Pharmacological Treatment on Heart Failure Patients in Mississippi and its Impact on Re-admission
PROJECT TYPE: New Project
RESEARCHER(S): Keri A. Barron
COLLEGE/DIVISION: College of Nursing
DEPARTMENT: Systems Leadership and Health Outcomes
FUNDING AGENCY/SPONSOR: N/A
IRB COMMITTEE ACTION: Exempt Review Approval
PERIOD OF APPROVAL: 03/04/2016 to 03/03/2017
Lawrence A. Hosman, Ph.D.
Institutional Review Board



INSTITUTIONAL REVIEW BOARD

118 College Drive #5147 | Hattiesburg, MS 39406-0001

Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional.review.board

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- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: CH16030304

PROJECT TITLE: An Exploratory Study of the Utilization of Evidence-based Pharmacological Treatment on Heart Failure Patients in Mississippi and its Impact on Re-admission

PROJECT TYPE: Change to a Previously Approved Project

RESEARCHER(S): Keri A. Barron

COLLEGE/DIVISION: College of Nursing

DEPARTMENT: Systems Leadership and Health Outcomes

FUNDING AGENCY/SPONSOR: N/A

IRB COMMITTEE ACTION: Exempt Review Approval

PERIOD OF APPROVAL: 09/16/2016 to 09/15/2017

Lawrence A. Hosman, Ph.D.

Institutional Review Board

APPENDIX C – Healthcare Institution Approval Letter

December 14, 2016

To Whom It May Concern:

This letter confirms our willingness to allow Keri Baron, doctoral candidate, was approved to conduct dissertation research on August 1, 2016 at Anderson Regional Medical Center (ARMC) in Meridian, Mississippi. Our understanding is this will assist her in data collection for her dissertation. She will not receive any protected health information from ARMC or its affiliates.

If you have any questions or need further information, please contact Jason Cain, Director of Nursing at 601-553-6779 or jcain@andersonregional.org.

Sincerely,



Jason Cain, RN BSN
LEAN Healthcare Certified
Director of Nursing
Director of Surgical Services
Anderson Regional Health System
2124 14th Street
Meridian, MS 39301

W 601-553-6779
C 601-604-7158
F 601-553-6617
E jcain@andersonregional.org

www.andersonregional.org

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